

REMARKS

The undersigned thanks Examiner Alejandro for the courtesies extended during the interview of November 5, 2003. The Interview Summary states:

[A]pplicant wanted to discuss what appears to be the difference between the prior art and the instant claims; particularly: the specific electronically insulating proton conductor that is capable of converting chemical energy of a reaction. In that, it was contended [by the Examiner] that the instant claims simply recite an electronically insulating proton conductor, that is, any material exhibiting electrolytic behavior.

Foremost, the Examiner's understanding of the claimed invention as being directed to "any material exhibiting electrolytic behavior" is totally incorrect. This invention is directed to EIPCs *of a membrane electrode assembly* that actually *converts* chemical energy of a reaction into electrical energy within a specified temperature range wherein the EIPC is supported on an electronically conducting support. The Examiner has treated "of a membrane electrode assembly" as being an intended use. This interpretation is incorrect. The claimed EIPCs are EIPCs *of a membrane electrode assembly*.

Some things *must* be defined with a qualifier "of a ..." in order to accurately and correctly define the thing. Such a qualifier is *not* intended use but a way to accurately define the thing as understood by persons skilled in the art. For example, a button of coat is totally different from a button of a keyboard. One needs to define a button of a coat as a button *of a coat* in order to accurately and precisely define this button and to distinguish it over other buttons such as a button of a keyboard. Similarly, the instant claims accurately define the EIPCs as the EIPCs *of a membrane electrode assembly* to distinguish over other EIPCs that not of a membrane electrode assembly.

Independent claims have been amended to positively recite that the EIPC of a MEA *converts* chemical energy to electrical energy and “wherein the EIPC is supported on an electronically conducting support.” This amendment is supported by the Background of the Invention which states, “electronically insulating proton conductors on one or both sides of the *support* foil,” page 1, lines 18 and 19, and “the electronically conducting metal foil (or D component)” on page 23, lines 20 and 21. Claim 32 has been amended such that “metal hydride substrate” has been changed to “metal hydride support” as this phrase has been used throughout the specification, for example, on page 1, line 17.

New claims 63-68 are supported by Figures 2 and 10 and original claim 61. New claims 69-74 are supported by the disclosure on page 28, line 15 to page 29, line 18.

Claims 1, 3, 31, 44 and 46 were rejected as being anticipated by Norby. Claims 1, 3, 44 and 46 were rejected as being anticipated by Hsu. Claims 1, 3, 44 and 46 were rejected as being anticipated by Crome. These rejections are respectfully traversed.

Neither Norby, Hsu nor Crome discloses an “EIPC [that] is supported on an electronically conducting support” *and* converts chemical energy to electrical energy in the claimed temperature range. The reason is simple—nobody prior to this invention has been successful in converting chemical energy to electrical energy using an EIPC supported on an electronically conducting support and at a temperature in the claimed temperature range to produce electrical energy, for example, in an useful range of greater than 10^{-3} S/cm as shown by the “gap” in Figure 2 of the specification. Figure 2 is obtained from Norby, the very Norby reference cited by the Examiner.

Norby, Hsu and Crome not only fail to disclose either explicitly or inherently an EIPC supported on an electronically conducting support that converts chemical energy to electrical energy, but they are *not* even enabling disclosures because they do not teach one of ordinary skill in the art as to how to make an EIPC *supported on an electronically conducting support* that *actually converts* chemical energy to electrical energy in the claimed temperature range.

In fact, during the interview, the Examiner acknowledged to the undersigned that he has examined fuel cell cases that relate to conversion of chemical energy to electrical energy for the last five years but has not found any reference in which a fuel cell operates in the claimed temperature range. Instead, he said that he has come across some references that disclose polymeric EIPCs that operate at about 100°C and other references in which the EIPCs operate above 550°C.

A non-enabling reference does *not* qualify as prior art for making an anticipation rejection. “In determining that quantum of prior art disclosure which is necessary to declare an applicant’s invention ‘not novel’ or ‘anticipated’ within section 102, the stated test is whether a reference contains an ‘enabling disclosure’... .” *In re Hoeksema*, 399 F.2d 269, 158 USPQ 596 (CCPA 1968). Also, note that MPEP 2121.02 states, “Where a process for making the compound is not developed until after the date of invention, the mere naming of a compound in a reference, without more, cannot constitute a description of the compound. *In re Hoeksema*, 399 F.2d 269, 158 USPQ 596 (CCPA 1968).” Prior to this invention, there was *no* process or a system by which persons of ordinary skill in this art could convert chemical energy to electrical energy using an EIPC supported on an electronically conducting support in the claimed

temperature range to produce electrical energy, for example, in an useful range of greater than 10^{-3} S/cm.

All that Norby, Hsu and Chome do are name a few EIPCs and nothing more. These references do *not* teach how one should make an EIPC supported on an electronically conducting support and how one should use such an EIPC supported on an electronically conducting support to convert chemical energy to electrical energy.

Claim 31 was rejected as being obvious over Crome. Claims 32 and 33 were rejected as being obvious over (a) Norby in view of Deublein; (b) Hsu in view of Deublein; and (c) Chome in view of Deublein. These rejections are respectfully traversed.

Deublein does *not* fill the gaps in Norby, Hsu and Chome discussed above.¹ In particular, Deublein fails to disclose an “EIPC [that] is supported on an electronically conducting support” *and* converts chemical energy to electrical energy in the claimed temperature range. The electrolyte of Deublein conducts ionic hydride (H^-), *not* protons. Persons of ordinary skill in this art would recognize that ionic hydride and protons are totally different and chemically incompatible because ionic hydride and protons will react with each other to produce hydrogen. Thus the Applicant respectfully submits that the Examiner is rather confused about Deublein because it is totally unrelated to the claimed invention. Deublein does *not* disclose an EIPC, in

¹ Deublein discloses that simple thermodynamic principles can be used to predict conditions under which metals will not form H blocking surface oxide layers in electrolytes. These principles were used to show that very low activities of O and H_2O can be produced in some halide-based salt melts by the incorporation of alkali hydrides. Under these conditions, some normally very reactive metals will not form oxide surface layers. As a result, rapid interfacial and surface/bulk equilibrium with H could be attained. Experiments are presented that verify these principles in the Ti-H and V-H systems by using electrochemical methods to measure the thermodynamics and kinetic aspects of the solution of H and the formation of metal hydrides. In addition, it was shown that interfacial equilibrium is obtained very rapidly upon Fe and Al in such metals.

which "P" stands for protons (H^+), which is distinct from and incompatible with ionic hydride (H^-).

In light of this Amendment, a Notice of Allowance is respectfully solicited.

In the event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No.03-1952** referencing **491712000100**.

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Respectfully submitted,

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